

Computer Network Lab



LAB WORK # 10

Submitted By
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Submitted to : Hurmat Hidayat
(INSTRUCTOR CS)

DEPARTMENT OF COMPUTER SCIENCE
FAST NATIONAL UNIVERSITY OF COMPUTER
AND EMERGING SCIENCES, PESHAWAR

Session 2020-2024

Q1: What is the source and destination port numbers?

tcp						
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.008010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4
3	0.008080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
4	0.008579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789
20	0.442648	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]

> Frame 1: 78 bytes on wire (624 bits), 78 bytes captured (624 bits)

> Ethernet II, Src: Apple_ac:6c:26 (10:9a:dd:ac:6c:26), Dst: Cisco-Li_e3:e9:8d (00:16:b6:e3:e9:8d)

> Internet Protocol Version 4, Src: 192.168.1.122, Dst: 64.238.147.113

> Transmission Control Protocol, Src Port: 60643, Dst Port: 80, Seq: 0, Len: 0

HTTP :
source port numbers = 60643
destination port numbers = 80

tcp						
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.008010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793
3	0.008080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
4	0.008579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
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7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789
20	0.442648	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]

> Frame 4: 257 bytes on wire (2056 bits), 257 bytes captured (2056 bits)

> Ethernet II, Src: Apple_ac:6c:26 (10:9a:dd:ac:6c:26), Dst: Cisco-Li_e3:e9:8d (00:16:b6:e3:e9:8d)

> Internet Protocol Version 4, Src: 192.168.1.122, Dst: 64.238.147.113

> Transmission Control Protocol, Src Port: 60643, Dst Port: 80, Seq: 1, Ack: 1, Len: 191

Source Port: 60643
Destination Port: 80
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 191]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 2682012318
[Next Sequence Number: 192 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 349487777

0020 93 71 ef e3 00 50 9f dc 42 9e 14 d4 c2 a1 80 18 .q...P...B.....
0030 ff ff 2f 5f 00 00 01 01 08 0a 0f 4c 9f c9 ef 6c ../.....L...l
0040 ed fd 47 45 54 20 2f 73 69 67 63 6f 6d 6d 2f 32 ..GET /s igcomm/2
0050 30 31 31 2f 70 61 70 65 72 73 2f 73 69 67 63 6f 011/pape rs/sigco
0060 6d 6d 2f 70 32 2e 70 64 66 20 48 54 54 50 2f 31 mm/p2.pd f HTTP/1

Destination Port (from default) ? bytes

Packets: 1179 / Download: 1177 (100.0%)

TCP :
source port numbers = 80
destination port numbers = 60643

4	0.088579	192.168.1.122	64.238.147.113	HTTP	257 GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
5	0.177819	64.238.147.113	192.168.1.122	TCP	66 80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=401689
6	0.178321	64.238.147.113	192.168.1.122	TCP	311 80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=401689
7	0.178388	192.168.1.122	64.238.147.113	TCP	66 60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679793
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=401689
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=401689
10	0.266787	192.168.1.122	64.238.147.113	TCP	66 60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256679793
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=401689
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=401689
13	0.354647	192.168.1.122	64.238.147.113	TCP	66 60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256679793
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=401689
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=401689
16	0.355579	192.168.1.122	64.238.147.113	TCP	66 60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256679793
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=401689
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=401689
19	0.442003	192.168.1.122	64.238.147.113	TCP	66 60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256679793
20	0.442648	64.238.147.113	192.168.1.122	TCP	1434 80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=401689

> Frame 5: 66 bytes on wire (528 bits), 66 bytes captured (528 bits)

> Ethernet II, Src: Cisco-Li_e3:e9:8d (00:16:b6:e3:e9:8d), Dst: Apple_ac:6c:26 (10:9a:dd:ac:6c:26)

> Internet Protocol Version 4, Src: 64.238.147.113, Dst: 192.168.1.122

> Transmission Control Protocol, Src Port: 80, Dst Port: 60643, Seq: 1, Ack: 192, Len: 0

Source Port: 80

Destination Port: 60643

[Stream index: 0]

[Conversation completeness: Complete, WITH_DATA (31)]

[TCP Segment Len: 0]

Sequence Number: 1 (relative sequence number)

Sequence Number (raw): 349487777

[Next Sequence Number: 1 (relative sequence number)]

Acknowledgment Number: 192 (relative ack number)

Acknowledgment number (raw): 2682012509

```

0000  10 9a dd ac 6c 26 00 16 b6 e3 e9 8d 08 00 45 20  ....1&.. ....E
0010  00 34 a4 3a 40 00 2d 06 12 e8 40 ee 93 71 c0 a8  .4.:@.-. .@.q.
0020  01 7a 00 50 ec e3 14 d4 c2 a1 9f dc 43 5d 80 10  -z.P... ..C]..
0030  06 b4 a4 c9 00 00 01 01 08 0a ef 6c ee 57 0f 4c  .....l.W.L
0040  9f c9  ..

```

Q2: What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection? What is it in the segment that identifies the segment as a SYN segments?

Ans: The (relative) sequence number is zero (Seq=1) and the flags are set such that SYN is set.

trace-tcp (1).pcap									
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tcp									
No.	Time	Source	Destination	Protocol	Length	Info			
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=0 TSval=256679793 TSecr=0 SACK_PERM=1			
2	0.088010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4			
3	0.088080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437			
4	0.088579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1			
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881			
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]			
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528			
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]			
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]			
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538			
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]			
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13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615			
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]			
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]			
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20	0.442648	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]			

1011 = Header Length: 44 bytes (11)

Flags: 0x002 (SYN)

000. = Reserved: Not set

...0. = Nonce: Not set

....0. = Congestion Window Reduced (CWR): Not set

....0. = ECN-Echo: Not set

....0. = Urgent: Not set

....0. = Acknowledgment: Not set

....0. = Push: Not set

....0. = Reset: Not set

>0. = Syn: Set

....0. = Fin: Not set

[TCP Flags:S.]

Window: 65535

```

0000  00 15 b6 e3 e9 8d 10 9a dd ac 6c 26 00 00 45 00  ....18.E
0010  00 40 9f 8a 40 00 00 06 04 ac c0 a8 01 7a 40 ee  .@.@...20
0020  93 71 ec e3 00 50 9f dc 42 9d 00 00 00 00 b0 32  q..P..B.....
0030  ff ff 22 12 00 00 02 04 05 b4 01 03 03 03 01 01  .....

```


trace-tcp (1).pcap

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1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
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15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789
20	0.442648	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
21	0.442716	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=12558 Win=523944 Len=0 TSval=256680230 TSecr=4016893789

[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 2682012317
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 0
Acknowledgment number (raw): 0
1011 = Header Length: 44 bytes (11)
> Flags: 0x002 (SYN)
Window: 65535
[Calculated window size: 65535]
Checksum: 0x2212 [unverified]
[Checksum Status: Unverified]

0000 00 16 b6 e3 e9 8d 10 9a dd ac 6c 26 08 00 45 001&-E-

trace-tcp (1).pcap

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No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.088010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4
3	0.088080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
4	0.088579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
6	0.178321	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
7	0.178388	192.168.1.122	64.238.147.113	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]
8	0.189114	64.238.147.113	192.168.1.122	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789
20	0.442648	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]

> Flags: 0x010 (ACK)
000. = Reserved: Not set
...0. = Nonce: Not set
...0. = Congestion Window Reduced (CWR): Not set
...0. = ECN-Echo: Not set
...0. = Urgent: Not set
...1. = Acknowledgment: Set
...0. = Push: Not set
...0. = Reset: Not set
...0. = SYN: Not set
...0. = FIN: Not set
TCP Flags: 0x010 (ACK)
Window: 1716
[Calculated window size: 6864]

0000 10 9a dd ac 6c 26 00 16 b6 e3 e9 8d 08 00 45 201&-E-
0010 00 34 a4 3a 40 00 24 06 12 e8 40 ee 93 71 c0 e8 4:-@---@q-
0020 61 7a 80 50 ec e3 14 44 c2 a1 20 6c 00 80 10 2:P---@-
0030 80 b4 a4 c9 00 80 01 01 80 8a ef 6c ee 5f 87 4c1&-L
0040 9f c9 ..

This shows the raw value of the acknowledgment number (tcp_ack_raw), 4 bytes

Packets: 1172 / Displayed: 1172 (100.0%)

Profile: Default

Q4: What is the sequence number of the SYNACK segment sent by the server to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did server determine that value? What is it in the segment that identifies the segment as a SYNACK segment?

Ans:

The sequence number of the SYNACK segment sent by server to the client computer in reply to the SYN is **seq=0**

1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.008010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4
3	0.008080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789
20	0.442648	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [PSH, ACK] Seq=11190 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
21	0.442716	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=12558 Win=523944 Len=0 TSval=256680230 TSecr=4016893789

[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 349487776
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 2682012318
1010 = Header length: 40 bytes (10)
Flags: 0x012 (SYN, ACK)
000. = Reserved: Not set
...0 = Nonce: Not set
...0 = Congestion Window Reduced (CWR): Not set
...0 = ECN-Echo: Not set

The Sequence number(raw) is = 2682012317

What is the value of the Acknowledgement field in the SYNACK segment?

No.	Time	Source	Destination	Protocol	Length	Info
4	0.008579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
1168	4.111504	64.238.147.113	192.168.1.122	HTTP	495	HTTP/1.1 200 OK (application/pdf)
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.008010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4
3	0.008080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789

[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 2682012317
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 0
Acknowledgment number (raw): 0
1011 = Header length: 44 bytes (11)
Flags: 0x002 (SYN)
000. = Reserved: Not set
...0 = Nonce: Not set
...0 = Congestion Window Reduced (CWR): Not set
...0 = ECN-Echo: Not set

The Sequence number(raw) is = 2682012317

Add 1 into the sequence number in previous sequence number

After add 1 the new sequence number is 2682012318

1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.008010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4
3	0.008080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789

[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 349487776
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 2682012318
1010 = Header Length: 40 bytes (10)
Flags: 0x012 (SYN, ACK)
000. = Reserved: Not set
...0 = Nonce: Not set
...0 = Congestion Window Reduced (CWR): Not set
...0 = ECN-Echo: Not set

Q4:What is the length of each of the first six TCP segments?

The 1st segment length is 191 bytes

```
Source Port: 60643
Destination Port: 80
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 191]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 2682012318
[Next Sequence Number: 192 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 349487777
1000 .... = Header Length: 32 bytes (8)
v Flags: 0x018 (PSH, ACK)
    000. .... = Reserved: Not set
    ...0 .... = Nonce: Not set
```

0020	93 71 ec e3 00 50 9f dc 42 9e 14 d4 c2 a1 80 18	..q...P...B.....
0030	ff ff 2f 5f 00 00 01 01 08 0a 0f 4c 9f c9 ef 6c	.../_....L...l
0040	ed fd 47 45 54 20 2f 73 69 67 63 6f 6d 6d 2f 32	..GET /s igcomm/2
0050	30 31 31 2f 70 61 70 65 72 73 2f 73 69 67 63 6f	011/pape rs/sigco
0060	6d 6d 2f 70 32 2e 70 64 66 20 48 54 54 50 2f 31	mm/p2.pd f HTTP/1

TCP Segment Len (tcp.len), 1 byte

The 2nd segment length is 245 bytes

6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=68
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=52428
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=5239
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=5239
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=5239
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523

Transmission Control Protocol, Src Port: 80, Dst Port: 60643, Seq: 1, Ack: 192, Len: 245

Source Port: 80
Destination Port: 60643
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 245]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 349487777
[Next Sequence Number: 246 (relative sequence number)]
Acknowledgment Number: 192 (relative ack number)
Acknowledgment number (raw): 2682012509
1000 = Header Length: 32 bytes (8)
v Flags: 0x018 (PSH, ACK)
000. = Reserved: Not set

0020	01 7a 00 50 ec e3 14 d4 c2 a1 9f dc 43 5d 80 18	..z.P...C]..
0030	06 b4 fb 3d 00 00 01 01 08 0a ef 6c ee 58 0f 4c	...=....l.X.l
0040	9f c9 48 54 54 50 2f 31 2e 31 20 32 30 30 20 4f	..HTTP/1 .1 200 0
0050	4h 0d 0a 44 61 74 65 3a 20 54 68 75 2c 20 31 32	K..Date: Thu, 12

The 3th segment length is 0 bytes

Wireshark interface showing a packet capture of a TCP connection. The packet list shows a GET request for a PDF file. The packet details pane shows the TCP segment structure, including sequence numbers, acknowledgment numbers, and flags. The packet bytes pane shows the raw data of the segment.

No.	Time	Source	Destination	Protocol	Length	Info
4	0.088579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
1168	4.111504	64.238.147.113	192.168.1.122	HTTP	495	HTTP/1.1 200 OK (application/pdf)
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.000010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSecr=256679793 WS=4
3	0.000000	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789

Transmission Control Protocol, Src Port: 60643, Dst Port: 80, Seq: 192, Ack: 246, Len: 0

Source Port: 60643
Destination Port: 80
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 192 (relative sequence number)
Sequence Number (raw): 2682012509
[Next Sequence Number: 192 (relative sequence number)]
Acknowledgment Number: 246 (relative ack number)
Acknowledgment number (raw): 349488022
1000 = Header Length: 32 bytes (8)
Flags: 0x010 (ACK)
0000 = Reserved: Not set

0000 00 16 b6 e3 e9 8d 10 9a dd ac 6c 26 08 00 45 001&..E-
0010 00 34 5f be 40 00 40 06 44 84 c0 a0 01 7a 40 ee .4.@.D...z@
0020 93 71 ec e3 00 50 9f dc 43 5d 14 d4 c3 96 80 10 q..P..C].....
0030 ff ff aa 2e 00 00 01 01 08 0a 0f ac 20 22 ef 6cL".l
0040 ee 58 -X

This shows the raw value of the sequence number (tcp.seq_raw), 4 bytes

Packets: 1172 · Displayed: 1172 (100.0%)

Profile: Default

The 4th segment length is 1368 bytes

Wireshark interface showing a packet capture of a TCP connection. The packet list shows a GET request for a PDF file. The packet details pane shows the TCP segment structure, including sequence numbers, acknowledgment numbers, and flags. The packet bytes pane shows the raw data of the segment.

No.	Time	Source	Destination	Protocol	Length	Info
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
13	0.354647	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615
14	0.355174	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
15	0.355561	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]
16	0.355579	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703
17	0.440719	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
18	0.441973	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]
19	0.442003	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789

Transmission Control Protocol, Src Port: 80, Dst Port: 60643, Seq: 246, Ack: 192, Len: 1368

Source Port: 80
Destination Port: 60643
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 1368]
Sequence Number: 246 (relative sequence number)
Sequence Number (raw): 349488022
[Next Sequence Number: 1614 (relative sequence number)]
Acknowledgment Number: 192 (relative ack number)
Acknowledgment number (raw): 2682012509
1000 = Header Length: 32 bytes (8)
Flags: 0x010 (ACK)
0000 = Reserved: Not set

0020 01 7a 00 50 ec e3 14 d4 c3 96 9f dc 43 5d 80 10 -z.P....C]..
0030 06 b4 46 be 00 00 01 01 08 0a ef 6c ee 62 0f 4c ..F.....l.b.L
0040 9f c9 25 50 44 46 2d 31 2e 34 0d 25 e2 e3 cf d3 ..%PDF-1.4.%...
0050 0d 0a 31 30 35 20 30 20 6f 62 6a 20 3c 3c 2f 4c ..105 0 obj <</L
0060 69 6e 65 61 72 69 7a 65 64 20 31 2f 4c 20 35 36 inearize d 1/L 56

This shows the raw value of the sequence number (tcp.seq_raw), 4 bytes

Packets: 1172 · Displayed: 1172 (100.0%)

The 5th segment length is 1368 bytes

The 6th segment length is 0 bytes

Q5: Are there any retransmitted segments in the trace file? What did you check for (in the trace) in order to answer this question?

Ans:

The sequence number is 2682012509 .The ack number is 349488022 this

5 0.177819	64.238.147.113	192.168.1.122	TCP	66 80 + 60643	[ACK]	Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881	
6 0.178321	64.238.147.113	192.168.1.122	TCP	311 80 + 60643	[PSH, ACK]	Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP segment of a reassembled PDU]	
7 0.178388	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528	
8 0.189114	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP segment of a reassembled PDU]	
9 0.266705	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]	
10 0.266787	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538	
11 0.267657	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]	
12 0.354612	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]	
13 0.354647	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615	
14 0.355174	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]	
15 0.355561	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]	
16 0.355579	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703	
17 0.440719	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]	
18 0.441973	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]	
19 0.442003	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789	

Source Port: 60643
Destination Port: 80
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 192 (relative sequence number)
Sequence Number (raw): 2682012509
[Next Sequence Number: 192 (relative sequence number)]
Acknowledgment Number: 246 (relative ack number)
Acknowledgment number (raw): 349488022
1000 = Header Length: 32 bytes (8)
✓ Flags: 0x010 (ACK)
000. = Reserved: Not set
...0 = Nonce: Not set

0000 00 16 b6 e3 e9 8d 10 9a dd ac 6c 26 08 00 45 00l&..E-
0010 00 34 5f be 40 00 40 06 44 84 c0 a8 01 7a 40 ee -4_@_@ D...z@
0020 93 71 ec e3 00 50 9f dc 43 5d 14 d4 c3 96 80 10 -q...P...C].....
0030 ff ff aa 2e 00 00 01 01 08 0a 0f 4c a0 22 ef 6cL..y.l
0040 ee 58 ..X

TCP Segment Len (tcp.len), 1 bytePackets: 1172 · Displayed: 1172 (100.0%)Profile: D

The sequence number is 2682012509. the Ack number is 349490758 this so the both is same so they are retransmitted segments.

10 0.266787	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538	
11 0.267657	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP segment of a reassembled PDU]	
12 0.354612	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]	
13 0.354647	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=5718 Win=523944 Len=0 TSval=256680144 TSecr=4016893615	
14 0.355174	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=5718 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]	
15 0.355561	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=7086 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP segment of a reassembled PDU]	
16 0.355579	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=8454 Win=523944 Len=0 TSval=256680144 TSecr=4016893703	
17 0.440719	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=8454 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]	
18 0.441973	64.238.147.113	192.168.1.122	TCP	1434 80 + 60643	[ACK]	Seq=9822 Ack=192 Win=6864 Len=1368 TSval=4016893789 TSecr=256680144 [TCP segment of a reassembled PDU]	
19 0.442003	192.168.1.122	64.238.147.113	TCP	66 60643 + 80	[ACK]	Seq=192 Ack=11190 Win=523944 Len=0 TSval=256680230 TSecr=4016893789	

Source Port: 60643
Destination Port: 80
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 192 (relative sequence number)
Sequence Number (raw): 2682012509
[Next Sequence Number: 192 (relative sequence number)]
Acknowledgment Number: 2982 (relative ack number)
Acknowledgment number (raw): 349490758
1000 = Header Length: 32 bytes (8)
✓ Flags: 0x010 (ACK)
000. = Reserved: Not set
...0 = Nonce: Not set

0000 00 16 b6 e3 e9 8d 10 9a dd ac 6c 26 08 00 45 00l&..E-
0010 00 34 76 e5 40 00 40 06 2d 5d c0 a8 01 7a 40 ee -4v @_@ -]...z@
0020 93 71 ec e3 00 50 9f dc 43 5d 14 d4 ce 46 80 10 -q...P...C]...F@
0030 ff d5 9f 47 00 00 01 01 08 0a 0f 4c a0 79 ef 6c ...G.....L..y.l
0040 ee 62 ..b

TCP Segment Len (tcp.len), 1 bytePackets: 1172 · Displayed: 1172 (100.0%)Profile: D

